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Search for signatures of reflected light from the exoplanet HD 189733b by the method of residual dynamical spectra

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Abstract

© 2015, Pleiades Publishing, Ltd. The goal of the present study is the development and testing of a method for spectral detection of the light of host stars reflected from their exoplanets. The presented method is based on the analysis of dynamical spectra, which make it possible to obtain high signal-to-noise residual spectra after host star spectrum deduction. These residual spectra contain information on the light reflected from an exoplanet and on its albedo. The first results of such research for the exoplanet HD 189733b are presented in the paper. We obtained a series of a few dozens moderate-resolution spectra of the host star HD 189733. Individual spectra have a high signal-to-noise ratio (≈ 700) and cover a considerable part of the complete orbital cycle of the exoplanet. The use of the developed method allowed us to achieve a characteristic contrast of the reflected light detection at a level of 5×10^{-4} from the continuum. Investigation of the dynamic spectra with this characteristic value as a detection threshold has not revealed obvious evidence of the host star light reflected from the planet. Nevertheless, the obtained threshold is high, which demonstrates the necessity of the development of the method for the exoplanet monitoring studies.

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Keywords

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